

**Correctional Service Canada
Technical Services Branch
Electronics Systems**

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**ELECTRONICS ENGINEERING
SPECIFICATION
CONDUIT, SPACE AND POWER REQUIREMENTS
FOR SECURITY SYSTEMS FOR USE IN
FEDERAL CORRECTIONAL INSTITUTIONS**

AUTHORITY

This Specification is approved by the Correctional Service of Canada for the procurement and Installation of Conduits for Electronic Security Systems in Canadian federal correctional institutions.

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ABBREVIATIONS

The following abbreviations are used in this specification:

CER	Common Equipment Room
COTS	Commercial-Off-The- Shelf
CSA	Canadian Standards Association
CSC	Correctional Service Canada
DES	Director Engineering Services
EIA	Electronic Industries Association
EMT	Electrical Metallic Tubing
GFE	Government Furnished Equipment
MCCP	Main Communications and Control Post
PVC	Polyvinyl Chloride
RFP	Request for Proposal
SOW	Statement of Work
STR	Statement of Technical Requirements
TES	Terminal Equipment Space

DEFINITIONS

The following definitions are used in this specification:

Design Authority	Director, Engineering Services (DES) - Correctional Service Canada (CSC) is responsible for all technical aspects of the system design and implementation.
Contract Authority	Public Works and Government Services Canada (PW&GSC) is responsible for all contractual matters associated with the system design and implementation.
Contractor	The company selected as the successful bidder.
Project Officer	A CSC employee or a contracted person designated by DES to be responsible for the implementation of the project.
Off-the-shelf	Equipment currently on the market with available field reliability data, manuals, engineering drawings and parts price list.
Custom Equipment	Equipment designed and/or manufactured specifically for a specific contract.

1.0 INTRODUCTION

1.1 General

This specification defines the requirements for the design and installation of conduits, cable troughs, raceways and supporting system as well as space and power requirements for telecommunications and electronic security systems in the Correctional Service of Canada (CSC) facilities.

1.2 Scope

This specification has been developed to ensure high standards for the installation of conduits, cable troughs and details equipment space and power requirements for electronic systems. It defines workmanship standards which may not be fully covered in subsidiary specifications. All contractor's documentation and installation procedures shall meet this specification for reliability, maintainability, longevity, appearance and operational use.

1.3 Off-The-Shelf Equipment

Refer to SW0101 Section 1.1

1.4 Equipment Procurement

Any ordering of material before the approval of the system final design will be undertaken at the contractor's own risk. The Design Authority may authorize the procurement of certain long lead items at, or shortly after a preliminary design review of the proposed system.

2.0 **APPLICABLE DOCUMENTS**

The following documents of the issue in effect on the date of the Request for Proposal (RFP) shall form a part of this specification to the extent specified herein.

ES/SOW-0101	Statement of Work for Procurement and Installation of Electronic Systems
ES/SOW-0102	Statement of Work for Quality Control of Electronic Systems Installations
EIA-310-C	Electronic Industries Association Standard for Racks, Panels and Associated Equipment.
CSA C22.1	Canadian Electrical Code - Part 1 Safety Standard for Electrical Installations
CSA C22.2	Canadian Electrical Code - Part II
NBCC	National Building Code of Canada

3.0 REQUIREMENTS

3.1 General

The contractor shall supply all necessary conduits, cable troughs, raceways, supporting system and any other items that may be required for the satisfactory completion of the specified project. All installation workmanship shall be performed in accordance with the Statement of Work, Standards specified in Section 2.0 of this specification and all applicable national, provincial, and local electrical and building codes.

Provide an electrical riser showing all conduits routing as part of the submitted documentations. The diagram shall show the following: routing of the conduits, size / type of conduits, size / type of conductors, junction boxes, pull boxes, end devices, head end equipment, locations and room identifications where all raceway are terminated.

Conduits, ducts, trays, etc. may be either Government Furnished Equipment (GFE) or supplied and installed by the contractor depending on the particular institution. The determination will be made by the Design Authority and will be identified in the STR.

The contractor shall provide Electronic Industries Association (EIA) standard racks, panels and associated hardware according to the space requirements of this specification.

The contractor shall provide all necessary wiring, circuitries, electrical panels, circuit breakers and associated hardware according to the power requirements of this specification.

3.2 Environmental Conditions

All materials and equipment which are used in CSC installations shall be chosen with consideration being given to the intended use, safety, retention of appearance, maintainability and durability under rugged operating conditions. These materials shall perform over the following environmental ranges:

a. **Indoor Equipment**

Temperature: 0° C to 50° C; and

Humidity: 20% to 95% non-condensing.

b. **Outdoor Equipment**

Temperature: -40° C to +55° C; and

Humidity: up to 100% condensing.

3.3 Conduits, Cable Troughs and Raceways

3.3.1 Conduits

Conduits installed above ground, and accessible to the inmate population, shall be rigid steel conduit. Metal conduits installed in secure and inmate accessible areas shall be fitted with double the normal quantity of support hangars. All indoor supporting system shall be made of rigid steel as well.

In locations subject to extreme temperature changes, and/or where conduit lengths are of non-standard size, the contractor shall make provisions for the inclusion of conduit expansion joints. In addition, install expansion joints on all conduit runs where conduit make a transition from underground to above ground.

Outdoor conduit shall not be damaged by combinations of direct exposure to the sun, wind, rain, lightning, hail, snow and ice as may be expected to occur at each institution location.

Rigid Polyvinyl Chloride (PVC) conduits shall be used only in buried applications. Any aboveground outdoor runs shall be made of hot dip rigid galvanized steel conduits. Rigid PVC conduits shall not be threaded, but may be used with approved adapters and couplings applied in a manner consistent with industry standards. PVC conduits which cross roadways shall be encased in reinforced concrete duct bank. The contractor shall provide a suitable means of protecting the buried conduit against damage caused by digging or excavating. The preferred method is installing a tape marker directly above the conduit path.

All underground raceway shall be installed to meet the requirement of the Canadian electrical Code (CEC) Rule 12-012. The minimum burial depth shall exceed the requirement of the Canadian Electrical Code Table 53. In general, install buried cables or raceway at 1000mm below finish grade. All crossing of underground conduits shall be at the right angles with a minimum clearance of 300mm or as indicated by local Codes or local utilities.

Concrete in duct bank shall extend 75mm minimum around all conduits and to be reinforced with re-bar.

When power and communication conduits are installed in direct buried configuration into the same trench, keep 300mm clearance between power and communication conduits or as indicated by local Codes or local utilities.

When power and communication conduits are installed in reinforced concrete duct bank, install a 25mm x 300mm wooden plank between power and communication conduits or as indicated by local Codes or local utilities.

Native backfill material shall not contain rocks over 50mm in diameter for the first 300mm over conduits. Backfill to be compacted every 300mm minimum. Provide 150mm of sand all around the conduits or the duct bank.

Local codes refer to provincial revision of National Building Code of Canada and provincial revision of the Canadian Electrical Code. Local utilities refer to the electrical utilities within the province of work. Any variance or alternate method of installation shall be confirmed in writing with the Design Authority without exception.

Minimum conduit size used shall be 21mm for all underground and above ground systems.

Electrical Metallic Tubing (EMT) conduit may be used in administrative areas, and locations which are not normally assessable to the inmate population. Steel set-screw couplings and connectors can be used only when the conduit run is installed above the sprinkler lines. Use Rain tight couplings and connectors where conduits are routed below the sprinkler line or in vertical exposed transition in sprinkled rooms.

Liquid-tight flexible metal conduits may be used where a flexible connection is required, ie. cameras, microwave dishes, etc. In such applications, the length of "flex" conduit shall not exceed more than one (1) meter.

In addition to these requirements, the latest issue of applicable industrial standards apply, including:

- a. CSA C22.2 No. 83 – Electrical metallic tubing (EMT).
- b. CSA C22.2 No. 22.2 No. 211.2 – Rigid PVC conduit (PVC).
- c. CSA C22.2 No. 45 – Rigid metal conduit.
- d. CSA-C22.2 No. 227.3 – Flexible conduit.

3.3.2 Cable Troughs and Raceways

Cable troughs and raceways shall be continuous and shall be constructed of metal. The contractor shall provide adequate mounting devices which will permit the use of fastening devices that will not damage conductor insulation. Any raceway system installed outdoor in exposed locations shall be made hot dip galvanized rigid steel.

Cable troughs enclosure shall be rated CSA Type 1 in non-sprinklered room and CSC Type 2 in sprinklered locations. Cable troughs shall not be installed in location accessible to the inmate population.

Cable troughs, raceways, and fittings shall be free from burrs or other sharp edges which may cause damage to the cable or insulated conductors. All troughs and raceways shall be installed as a complete system before the conductors or cables are installed. All equipment shall be CSA approved.

Cable troughs may be either ventilated or solid and unless otherwise specified, shall be equipped with covers and steel guards to protect against damage.

All underground raceway shall be installed to meet the requirement of the Canadian electrical Code

(CEC) Rule 12-012. The minimum burial depth shall exceed the requirement of the Canadian Electrical Code Table 53. In general, install buried cables or raceway at 1000mm below finish grade. All crossing of underground conduits shall be at the right angles with a minimum clearance of 300mm or as indicated by local Codes or local utilities.

Concrete in duct bank shall extend 75mm minimum around all conduits and to be reinforced with re-bar.

Native backfill material shall not contain rocks over 50mm in diameter for the first 300mm over conduits. Backfill to be compacted every 300mm minimum. Provide 150mm of sand all around the conduits or the duct bank.

Local codes refer to provincial revision of National Building Code of Canada and provincial revision of the Canadian Electrical Code. Local utilities refer to the electrical utilities within the province of work. Any variance or alternate method of installation shall be confirmed in writing with the Design Authority without exception.

In addition to these provisions, the latest issue of appropriate standards shall apply, including:

- a. CSA Standard C22.2 - Raceways and Fittings.
- b. CSA C22.2 No. 26 - Construction and test of wireways, auxiliary gutters, and associated fittings.
- c. CSA C22.2 NO 62 - Surface raceway systems.

4.0 SYSTEM REQUIREMENTS

Summary tables of the electronic security systems minimum conduit, space and power requirements are provided as per Appendix A, Appendix B and Appendix C respectively to this specification.

4.1 Perimeter Intrusion Detection Systems

4.1.1 Motion Detection System

The Motion Detection System (MDS) is designed to detect motion between the fences. One system which is type approved for use in CSC uses the Leaky Coax - buried cable technology. The perimeter is divided into sectors and two sectors are controlled by a single local control module. Signal and power fed to the field mounted electronic controllers via the buried coax cables. The main MDS control modules are installed in the common equipment room (CER).

4.1.1.1 Conduit Requirements

Cable entry to the area between the two perimeter fences is made at a single point, usually at the gatehouse. One (1) 41 mm conduit is required from the CER to the area between the two perimeter fences. This conduit is stubbed underground between the fences several meters from the gatehouse.

4.1.1.2 Space Requirements

The MDS control equipment will normally occupy about half of the area of a 2.483 meter rack, usually supplied by the PIDS contractor.

4.1.1.3 Power Requirements

The power requirement for the MDS equipment in the CER is a 120 VAC, 15.0 ampere, uninterruptable power supply. Fed from a dedicated circuit.

4.1.2 Fence Disturbance Detection System

The Fence Disturbance Detection System (FDS) is designed to detect particular movement and vibration patterns on the inner perimeter fence. This is accomplished by mounting electro-mechanical fence sensors (geophones, electret or piezoelectric vibration detectors) on the fence. The perimeter is divided into sectors and one array of sensors covers one sector. The cables from all the sectors are run along the top of the fence to the gatehouse and to the control equipment mounted in the CER.

4.1.2.1 Conduit Requirements

FDS cable entry to the inner perimeter fence is made at a single point, usually at the gatehouse. Depending on the size of the perimeter and the number of sectors, the requirement is for a minimum of one (1) 41 mm conduit from the gatehouse to the top of the inner fence. The conduit is capped with a weather proof cable outlet.

4.1.2.2 Space Requirements

The FDS control equipment will normally occupy approximately half of the area of a 2.483 m rack supplied by the contractor.

4.1.2.3 Power Requirements

The power requirement for the FDS equipment in the CER is a 120 VAC, 15.0 ampere, uninterruptible power supply. Fed from a dedicated circuit.

4.1.3 PIDS Microwave

Bistatic microwave (beam) systems are normally installed across the pedestrian and vehicle entrance portals (sallyports) to detect movement in the area. The microwave systems are integrated into the PIDS motion detection system. These systems allow small portal sectors to be turned off to allow authorized staff and vehicle access without effecting the entire perimeter security.

4.1.3.1 Conduit Requirements

Microwave cable to each of the pedestrian and vehicle sallyport areas are required from the closest motion detection system (MDS) local control module. One buried (1) 21 mm PVC conduit is required from each sallyport to the closest perimeter MDS unit.

4.1.3.2 Space Requirements

The control equipment will normally occupy approximately 0.5 meter of rack space supplied by the contractor.

4.1.3.3 Power Requirements

The power requirement for the microwave equipment in the CER is a 120 VAC, 15.0 ampere, interruptible power supply. Fed from a dedicated circuit.

4.1.4 PIDS Closed Circuit Television

Closed Circuit Television (CCTV) Colour IP cameras are placed in strategic positions around the perimeter fence. The cameras monitor the institutional side of the inside perimeter fence and the area between the perimeter fences. When an alarm is triggered by the FDS and/or MDS, the CCTV cameras associated with the sector in alarm will be displayed on the video wall display A in the MCCP in a quad-split view. During an alarm period the video displayed on the monitors from the selected cameras are recorded on a time-lapse Network Video Recording System.

The CCTV cameras are strategically placed around the perimeter of the institution mounted typically on free standing and guard towers.

4.1.4.1 Conduit Requirements

CCTV Signal and Control. In original installations, two (2) 53 mm conduits ran from the CER to the perimeter cameras in the corners of the perimeters in both directions. One for video coax cable, the other for wiper control, 24 VAC or 120 VAC. These conduits for the CCTV camera signal and control wiring terminated in an exterior distribution box mounted on the closest camera towers. Two (2) 53 mm conduits ran around the perimeter terminating at each of the camera groups at the perimeter corners.

New or upgraded CCTV camera and tower installations may have one or two 41 mm conduits from service enclosures mounted on either the base of the guard tower or free standing towers around the perimeter.

CCTV AC Power. Originally, two (2) 38 mm conduits were provided from the power distribution panel in the CER to the power junction box on the closet perimeter camera tower. One conduit was required to run in both directions. One conduit was required to provide power to the heaters and camera wipers the other to provide power to the camera. These conduits may still be present at the camera towers and may or may not be in use.

New or upgraded CCTV camera and tower installations may have one 41mm conduit with 120 VAC into a service enclosure mounted on either the base of the guard tower or free standing towers around the perimeter.

4.1.4.2 Space Requirements

The video recording and control equipment installed in the CER require approximately one (1) or two (2) equipment racks.

The video wall large screen displays are installed in the MCCP for MDS and FDS perimeter monitoring.

4.1.4.3 Power Requirements

The power required in the CER for video systems control equipment is two (2) 120 VAC, 20.0 ampere circuits from the uninterruptible power supply.

The power requirement for the perimeter cameras is a 120 VAC, 20 ampere supply to each group of usually four (4) cameras from the power distribution panel in the CER.

4.1.5 MCCP Console

The control and annunciation equipment for the PIDS and the Facility Alarm Annunciation System (FAAS) are mounted in the console cabinets in the MCCP. The control and annunciation units are normally connected to processing equipment in the CER by cables running under the computer flooring. There is a requirement for rigid conduit between the MCCP and the CER for the 120 VAC

uninterruptible power supply (UPS).

4.1.5.1 Conduit Requirements

One (1) 21 mm conduit is required from the UPS location in the CER to the MCCP console.

4.1.5.2 Space Requirements

The console cabinet space requirement will depend on the number of systems provided at the institution and usually consists of six console racks in the MCCP joined together to form the control console. One medium equipment rack for the maintenance video display unit (VDU) and a low profile cabinet with sliding shelves for the time-lapse VCRs and printer.

The MCCP will require a room with a floor area of no less than approx. 23.6 square meters. The CER will require a room with a floor area of no less than 9.0 square meters for the equipment and approx. 6.3 square meters for spare equipment storage and maintenance. Both rooms require computer flooring, all conduits entering will be stubbed or terminated under the computer floor. Both rooms need to be as square as possible to allow for optimum equipment placement.

The UPS will require a room with a floor area of approx. 6.3 square meters if the UPS is located at a different site to the CER. The UPS can be located in the CER within the requirement shown above. The floor may be concrete.

The ventilation system in the CER should keep the temperature below 29.0 degrees C and vent to the outside to eliminate gases that may escape during battery operation or charging.

4.1.5.3 Power Requirements

The power requirement for the MCCP console is two (2) 120 VAC, dedicated 20.0 ampere, uninterruptible power circuits.

4.2 Facility Alarm Systems

4.2.1 Inmate Cell Call System

The ICCS is provided so that an occupant of a cell may request assistance from the control post. This is achieved by operating a call originating device (COD) mounted in the cell. The call is annunciated in the control post, the guard responds to the call and cancels the call by operating a call cancelling device (CCD) external to the cell and adjacent to the cell door.

4.2.1.1 Conduit Requirements

One (1) 16 mm conduit is required from each cell, the conduits from four cells are combined in a junction box in the pipe chase. Two or three of these junction boxes are linked together by 27 mm conduit. One (1) 41 mm conduit connects the group to the terminal equipment space (TES) where

they are terminated.

One (1) 27 mm conduit is provided from the TES to the control post. These are shared by the electronics contractors with each contractor using at least one each.

The cables interconnecting the equipment in the TES to the CER are normally installed in a cable tray which runs throughout the institution.

4.2.1.2 **Space Requirements**

The equipment should normally occupy half the area of one (1) 2.483 m rack in each TES.

4.2.1.3 **Power Requirements**

The power requirement for this system is a 120 VAC, fed from 15.0 ampere circuit.

4.2.2 **Fixed Point Security Alarm System**

The FPSA system is provided so that an occupant of designated rooms may request assistance from the control post. This is achieved by operating a call originating device (COD) mounted on the wall or under a desk. The call is annunciated in the control post, the guard responds to the room.

4.2.2.1 **Conduit Requirements**

One (1) 16 mm conduit is required from each designed room, the conduits from these rooms may be combined in a junction box. Two or three of these junction boxes may be linked together. The link will be 27 mm conduit and one (1) conduit 41 mm is then run to the CER where it is terminated under the computer flooring.

4.2.2.2 **Space Requirements**

The FPSA COD is mounted on a wall or under the desk in the designated room.

4.2.2.3 **Power Requirements**

The power requirement for this system is a 120 VAC, fed from 15.0 ampere circuit.

4.2.3 **Personal Portable Alarm System**

The PPA system is used by CSC staff working in all areas of the institution to alert the central security post staff to serious incidents or potentially dangerous personal security or safety situations. The PPA system consists of a central controller, a central receiver and a number of portable wireless transmitting devices (transmitters) in belt worn leather cases. PPA alarms are sent to the security post when these small portable transmitters are activated by the staff member. Alarm identification,

alarm time and cancellation may be recorded on a data logger.

4.2.3.1 Conduit Requirements

One (1) 16 mm conduit is required from the PPA receiver which is located in a central area of the institution to the MCCP where the PPA controller is located. This conduit will accommodate the twisted and alarm signal wires. One (1) 16 mm conduit is required between the PPA receiver and the antenna which is located on the roof, the side of a building or on an existing radio tower.

4.2.3.2 Space Requirements

The PPA receiver will be mounted in a rack or on the wall in a central location of the institution. The PPA controller will be mounted in the MCCP control or on a shelf in the CER.

4.2.3.3 Power Requirements

The power requirement for the PPA equipment in the MCCP is a 120 VAC, fed from 15.0 ampere, uninterruptible power circuit.

4.2.4 Portable Alarm Location System

The PAL system operates in conjunction with the Personal Portable Alarm (PPA) system to locate an area where the PPA alarm is originating from. The PAL system consists of central monitoring equipment, a number of nodes and a number of wireless sensors distributed within an institution. PPA alarm locations can be determined and sent to the security post. Alarm identification, alarm time and cancellation are data logged.

4.2.4.1 Conduit Requirements

One (1) 19 mm conduit is required from each PAL node which is located throughout the institution to the CER where the PAL controller is located. This conduit will accommodate a co-axial cable for the alarm signal from each node.

4.2.4.2 Space Requirements

The PALS nodes and wireless sensors will be mounted in the ceilings throughout the institution. The PALS controller in the CER will require approximately one (1) meter of rack space.

4.2.4.3 Power Requirement

The power requirement for the PALS equipment in the CER is one 120 VAC, fed from 15.0 ampere, uninterruptible power circuit.

4.3 Access Control & Supplementary Systems

4.3.1 Door Control & Corridor Monitoring System

This system provides room and corridor access by door control from a designated CP. The door control system is usually integrated with a CCTV system to allow staff to view the person(s) requesting access.

4.3.1.1 Conduit Requirements

Two (2) 16 mm conduits are required from under the CER floor or the TES to the room and corridor doors requiring controlled access. One conduit will accommodate the CCTV system for video and camera control purposes. The other conduit is required for the door access control system.

4.3.1.2 Space Requirements

The rack space requirement will usually consists of approximately 0.6 m of one (1) 2.483 m rack in the CER or TES and one (1) rack in the MCCP control console or CP console.

4.3.1.3 Power Requirements

The power requirement for the door control and monitoring system is one 120 VAC, 15.0 ampere circuit.

4.3.2 Closed Circuit Television System

This system allows observations to be made in cells, corridors, exercise yards and other locations where there is a need. The system usually consists of several cameras mounted at these locations with monitors grouped together at a convenient point such as the control post or the MCCP.

4.3.2.1 Conduit Requirements

Two (2) 16 mm conduits are required to each camera location, one for signal wiring and the other for VAC power to the camera and housing. If the camera has pan/tilt/zoom facilities, one of the two conduits may have to be increased in size to 21 mm to accommodate possible control wiring.

4.3.2.2 Space Requirements

The only space requirement for this system is rack space in a console for the monitors and possibly a pan/tilt/zoom controller.

4.3.2.3 Power Requirements

The power requirement for the CCTV equipment is one 120 VAC, fed from a 15.0 ampere circuit.

4.3.3 **Supplementary Intrusion Detection System**

This system provides supplement outdoor intrusion detection from the MCCP. The SIDS monochrome CCD camera is usually mounted on a high tower or rooftop to provide surveillance and assessment of designated area(s).

4.3.3.1 **Conduit Requirements**

Two (2) 16 mm conduits are required from under the CER floor to the outdoor camera location. One conduit will accommodate the CCTV system for video and camera control cables. The other conduit is required for the camera and enclosure VAC power.

4.3.3.2 **Space Requirements**

Rack space in the MCCP control console is required for the SIDS monitor and camera Pan/Tilt/Zoom controller. The size of the rack space will depend on the size of the monitor and controller.

4.3.3.3 **Power Requirements**

The power requirement for this system is a 120 VAC, fed from a 15.0 ampere circuit.

4.3.4 **Voice Recording Equipment**

The Voice Recorder Equipment (VRE) records all conversations on the telephones, radios, PA and PIDS PA systems in the MCCP.

VRE wiring can be run under the computer flooring and conduit is not normally required.

4.3.4.1 **Space Requirements**

The VRE is self contained in its own moveable rack and requires a floor area of 650 mm square with an equal area in front and behind for operator and technician access. It can be mounted with its back against a wall if required, however this is not preferable.

4.3.4.2 **Power Requirements**

The power requirement for this system is a 120 VAC, fed from a 15.0 ampere circuit.

4.3.5 **Video Recording Equipment**

Video recording equipment is part of the CCTV system

4.3.5.1 **Space Requirements**

Part of the CCTV system in the CER.

4.3.5.2 Power Requirements

The power requirement for this system is a 120 VAC, fed from a 20.0 ampere circuit.

4.4 Communications Systems

4.4.1 Two Way Communications Radio

The two way radio system provides routine operational, maintenance as well as emergency response communications between control posts, guards and vehicles in and around the facility. Base station radios and Digital Interface Units are installed in standard EIA electronic equipment racks in the CER.

The MCCP base station radios are connected to a common antenna mounted on an external tower. In the repeater configuration, the base stations are connected via a series of filters to a common antenna. Rack mounted remote radio controllers are mounted in the MCCP console. Digital Interface Units (DIU) are used to configure the base station radios for digital communications

Base station radios located in security control posts and maintenance control centres are connected to their own local antennas.

4.4.1.1 Conduit Requirements

One (1) 21 mm conduit is required from the CER to the antenna tower. The conduit may terminate at the base of the tower, if the tower is mounted on the roof. In the case of a ground mounted tower the conduit will continue up the tower. The lower portion of the tower is protected by anti-climb shields.

4.4.1.2 Space Requirements

Three base station radios with associated DIUs will use approximately half of a EIA standard 2.483 m equipment rack in the CER. If the radios are configured as repeaters and filters are used, another EIA standard 2.483 m rack will be required.

In the MCCP console, the remote controller will require 133 mm (3 U) of console cabinet space.

4.4.1.3 Power Requirements

The power requirement for this system is a 120 VAC, fed from a 15.0 ampere circuit.

4.4.2 Public Address System

The PA system is designed to allow the entire institution to be addressed or limited areas to be addressed from various points throughout the institution.

4.4.2.1 Conduit Requirements

Loudspeakers are distributed throughout the institution in areas where they are required. They are mounted in 254 mm x 254 mm x 102 mm back boxes mounted in the walls or in the ceilings. The boxes are joined in series by 16 mm conduit for the first ten or so boxes and then by 21 mm conduit to the cable tray. Where two strings of speaker boxes combine into one the resultant conduit is usually 21 mm. A 27 mm conduit is used between a TES and its respective control post.

4.4.2.2 Space Requirements

The PA equipment requires approximately half of a 2.483 m rack in the CER or half of a 2.483 m rack in a TES.

4.4.2.3 Power Requirements

The power requirement is for a 120 VAC, 15.0 ampere supply in the CER or a 120 VAC, 15.0 ampere supply in a TES.

4.4.3 Limited Call Intercom System (LCIS)

The LCIS is designed to provide communications between the control posts and points such as beyond a barrier controlled by the post. The control post has a master station mounted in a console and the remote station is mounted in a back box in the wall.

4.4.3.1 Conduit Requirements

The remote station is mounted in a 102 mm x 102 mm x 65 mm back box placed 1500 mm from the floor. One (1) 16 mm conduit connects these points to the TES or the cable tray. One (1) 27 mm conduit is used between a TES and its respective control post.

4.4.3.2 Space and Power Requirements

The LCIS usually forms part of the PA. Refer to the PA section for space and power requirements.

4.4.4 Restricted Visit Intercom System

The purpose of the RVIS is to provide a means of two-way (full-duplex) voice communication between an inmate and visitor while denying physical exchange. Typically, by providing transparent partitioning between the inmate and visitor, physical access is denied while allowing visual contact between each half of a restricted visiting booth. Within each booth, telephone handset will allow voice communication between the two halves. The control post has a master station mounted in a console.

4.4.4.1 Conduit Requirements

One (1) 16 mm conduit is required from each booth to the Restricted Visit Control Post.

4.4.4.2 Space Requirements

The RVIS telephone handsets are securely mounted on the wall of the booths. The RVIS controller is mounted in the console in the Restricted Visit CP.

4.4.4.3 Power Requirements

The power requirement for this system is a 120 VAC, fed from a 15.0 ampere circuit.

4.4.5 Cable Television

The Cable Television (CATV) System distributes television signals to each cell and various other points throughout the institution.

The signals are received from a CATV company. All these signals are processed in the head-end equipment and then distributed throughout the system.

4.4.5.1 Conduit Requirements

A conduit outlet is required in each cell and in various inmate and staff lounges. Groups of four cell block outlet boxes are connected to a junction box by 21 mm conduit. The junction boxes are linked in groups of two or three and then to the TES using 41 mm conduit.

All other locations utilize 21 mm conduit to their respective TES locations.

The cable distributing the signals to the TES from the head end location is distributed throughout the institution

4.4.5.2 Space Requirements

The head-end equipment will occupy a half of a 2.483 m rack in the equipment room closest to the CATV provider. The remainder of the equipment consists of amplifiers and splitters and are accommodated in cabinets located in each of the pertinent CATV locations. These cabinets can either be mounted on the wall or placed under the computer flooring.

4.4.5.3 Power Requirements

The power requirement for this system is a 120 VAC, 15.0 ampere supply.

4.5 **Control Posts (CP) and Terminal Equipment Spaces (TES)**

There are several control posts and TES's throughout the institution. They are usually paired and connected by banks of conduits to enable connection between the main equipment of the various systems and the control panels that are associated with them. The number of conduits provided is normally very generous and provides for any possible expansion or replacement of the systems.

4.5.1 **Conduit Requirements**

All the consoles in the control posts with computer flooring do not require conduits. Normally the TES and CP locations are connected by cable trays or at least one 53 mm conduit.

4.5.2 **Space Requirements**

In each TES accommodation is required for two 2.483 racks, one rack to house the cell call system, door control system and the other the PA and LCIS equipment.

4.5.3 **Power Requirements**

Two (2) 120 VAC, 15.0 ampere power circuits are required.

4.6 **Installation Requirements**

The conduit shall be installed at the site in accordance with the ES/SOW-0101, Procurement and Installation and the ES/SOW-0102, Quality Control.

4.7 **Documentation Requirements**

All as-build drawings and documentation shall be in accordance with the ES/SOW-0101, Procurement and Installation.

5.0 **QUALITY ASSURANCE**

5.1 **General**

All on-site installation work, and installation acceptance shall be conducted in accordance with the ES/SOW-0101, Procurement and Installation.

6.0 **DELIVERY**

Delivery requirements for drawings, plans, etc. (where applicable) shall be in accordance with the ES/SOW-0101, Procurement and Installation.

APPENDIX A

SUMMARY OF SYSTEM CONDUIT REQUIREMENTS

System	Conduit Requirements
MDS	One 41 mm conduit from the CER to the area between the two perimeter fences.
FDS	One 41 mm conduit from the CER to the inner perimeter fence.
MICROWAVE	One 21 mm conduit from the closest local control module to the sallyport area.
PIDS CCTV	<p>Signal and Control. Two 53 mm conduits from the CER to the perimeter camera towers in both directions with junction boxes at each of the towers. One 21 mm conduit from the junction box to the cameras on the tower.</p> <p>VAC Power. Two 53 mm conduits from the electrical distribution panel in the CER to the junction box on the perimeter. One 41 mm conduit around the perimeter providing power to each camera group.</p>
PIDS PA	Two 27 mm conduits from the CER to the first group of speakers on the perimeter fence, one in each direction. One 27 mm conduit between speaker locations.
MCCP	Control and signal cables (no conduit required) under the computer flooring to the CER. VAC UPS power in 21 mm conduit from the CER.
ICCS	One 16 mm conduit from each cell to a junction box in the pipe chase. Junction boxes linked together by 27 mm conduit. One 41 mm conduit from the group junction box to the CP/TES. One 27 mm conduit from the TES to the CP.
FPSA	One 16 mm conduit from each designed room to a junction box. Junction boxes connected by 27 mm conduit. One 41 mm conduit from a main junction box to the CER.
PPA	One 16 mm conduit from the PPA receiver to the MCCP. One 16 mm conduit from the PPA receiver to the antenna.
PALS	One 16 mm conduit from each PALS node to the CER.
Door Control	Two 16 mm conduits (one for CCTV, one for power) from the CER or from the TES to the room and/or corridor doors requiring controlled access.

System	Conduit Requirements
Supp. CCTV	Two 21 mm conduits to each camera location, one for signal wiring and the other for AC power to the camera and housing. If the camera has pan/tilt/zoom facilities, one of the two conduits may have to be increased in size to 21 mm to accommodate additional control wiring.
SIDS	Two 16 mm conduits from the CER to the camera location. One conduit for video and camera control cables. The other conduit for the camera and enclosure VAC power.
MCCP/VRE	Cables under the computer flooring.
MCCP/VCR	Cables under the computer flooring.
Two-way Radio	One 21 mm conduit from the Base Station to the antenna location.
Interior PA	One 16 mm conduit between speaker locations. Combine speaker locations require one 21 mm conduit. One 27 mm conduit from the TES to the CP.
LCIS	One 16 mm conduit from remote stations to the TES or the cable tray.
RVIS	One 16 mm conduit from each booth to the RVIS CP.
ECTV	One 16 mm conduit to in each cell and various inmate lounges. Groups of cell outlet boxes are connected to a junction box by 21 mm conduit. One 41 mm conduit from junction boxes to the TES. One 21 mm conduit from the head-end equipment rack and the antenna site.
CER/TES	CER and various TES are linked by one 53 mm conduit.

APPENDIX B

SUMMARY OF SYSTEM SPACE REQUIREMENTS

System	Space Requirements
MDS	The MDS control equipment requires approximately 1.5 m of EIA standard equipment rack space in the CER.
FDS	The FDS control equipment requires approximately 1.5 m of EIA standard equipment rack space in the CER.
MICROWAVE	The microwave control equipment requires approximately 0.5 m of EIA standard equipment rack space in the CER.
PIDS CCTV	<p>The video distribution and switching equipment require approximately 1.0 m of EIA standard equipment rack space in the CER.</p> <p>The PIDS CCTV equipment in the MCCP requires approximately 1.0 m of EIA standard console cabinet space.</p> <p>A separate standalone rack is required to house five (5) time lapse VCRs in the MCCP.</p>
PIDS PA	The PIDS PA equipment requires approximately 0.5 m of EIA standard equipment rack space in the CER.
MCCP	<p>The MCCP console usually consists of six EIA standard console cabinets joined together to form the control console.</p> <p>The maintenance video display unit (VDU) and ancillary equipment require approximately 1.0 m of EIA standard equipment rack space in the MCCP.</p> <p>The time-lapse VCRs and printer require a low profile cabinet with sliding shelves in the MCCP.</p>
ICCS	The ICCS control equipment requires approximately 1.5 m of EIA standard equipment rack space in the TES.
FPASA	The FPASA control equipment requires approximately 0.5 m of EIA standard equipment rack space in the CER.
PPA	The PPA receiver requires to be mounted on a shelf in a rack or on the wall in a central location of the institution. The PPA controller mounted on a shelf requires approximately 0.25 m of the rack space in the ancillary equipment rack space in the MCCP.

System	Space Requirements
PALS	The PALS nodes and wireless sensors will be mounted in the ceilings throughout the institution. The PALS controller requires approximately 1.0 m of EIA standard equipment rack space in the CER.
Door Control	The hall and door control equipment require approximately 1.0 m of EIA standard equipment rack space in the CER or TES. The operator control equipment requires approximately 0.25 m of rack space in the control console.
Suppl. CCTV	<p>Video switchers, multiplexers, etc. require rack space in EIA standard equipment racks in the CER or TES. The space requirement will depend on the type and amount of video equipment being used.</p> <p>The space requirement in the control console for the monitors and the pan/tilt/zoom controller if applicable will depend on the type and amount of video equipment being used.</p>
SIDS	The space requirement for the SIDS control equipment in the CER will depend on the type of equipment being used. Rack space in the control console is required for the monitors and a pan/tilt/zoom controller if applicable.
MCCP/VRE	The Voice Recording Equipment is usually self-contained in its own moveable rack in the MCCP and requires a floor area of 650 mm square with an equal area in front and behind for operator and technician access.
Two-way Radio	<p>Three base station radios with associated DIUs require approximately 1.5 m of EIA standard equipment rack space in the CER. If the radios are configured as repeaters, another EIA standard equipment is required for the filters.</p> <p>In the MCCP console, the remote controller requires 133 mm (3 U) of console cabinet space.</p>
Interior PA	The Public Address equipment requires approximately 1.5 m of EIA standard equipment rack space in the TES.

System	Space Requirements
LCIS	The Limited Call Intercom System usually forms part of the interior PA system.
RVIS	The Restricted Visit Intercom System controller is mounted in the console in the Restricted Visit CP.
ECTV	The Cable TV system head-end equipment requires approximately 1.5 m of EIA standard equipment rack space close to the antenna site. Amplifiers and splitters will be accommodated in the EIA standard equipment racks in the TES or amplifiers and splitters can be a small cabinet mounted on the wall or placed under the computer flooring.
TES	Each TES requires two EIA standard equipment racks, one rack to house the inmate cell call system, door control system and ancillary equipment. The other rack will house the interior PA and LCIS equipment.

APPENDIX C

SUMMARY OF SYSTEM POWER REQUIREMENTS

System	Power Requirements
MDS	The power requirement for the MDS equipment in the CER is one 120 VAC, 15.0 ampere, uninterruptible power circuit.
FDS	The power requirement for the FDS equipment in the CER is a 120 VAC, 15.0 ampere, uninterruptible power circuit.
MICROWAVE	The power requirement for the microwave equipment in the CER is a 120 VAC, 15.0 ampere, uninterruptible power circuit.
PIDS CCTV	The power required in the CER for video switching and control equipment is one 120 VAC, 15.0 ampere uninterruptible power circuit. The power requirement for the perimeter cameras is a 120 VAC, 20 ampere circuit to each group of usually four (4) cameras from the power distribution panel in the CER.
PIDS PA	The power requirement for the PIDS PA equipment in the CER is a 120 VAC, 15.0 ampere, uninterruptible power circuit.
MCCP	The power requirement for the MCCP console is two 120 VAC, 15.0 ampere, uninterruptible power circuits.
ICCS	The power requirement for the Inmate Cell Call System equipment in the security Control Post is a 120 VAC, 15.0 ampere circuit.
FPSA	The power requirement for the Fixed Point Security Alarm system equipment in the CER is a 120 VAC, 15.0 ampere circuit.
PPA	The power requirement for the Personal Portable Alarm system equipment in the MCCP is a 120 VAC, 15.0 ampere circuit.
PALS	The power requirement for the Portable Alarm Location System equipment in the CER is a 120V AC, 15.0 ampere circuit.
Door Control	The power requirement for the Hall, Corridor and Door Monitor and Control system in the security Control Post is a 120 VAC, 15.0 ampere circuit.
Suppl. CCTV	The power requirement for the Supplementary CCTV system equipment in the security Control Post is a 120 VAC, 15.0 ampere circuit.
SIDS	The power requirement for the Supplementary Intrusion Detection System equipment in the CER is a 120 VAC, 15.0 ampere circuit.

System	Power Requirements
MCCP/VRE	The power requirement for the Voice Recording Equipment in the MCCP is a 120 VAC, 15.0 ampere circuit.
MCCP/NVR	The power requirement for the Network Video Recorder equipment in the MCCP is a 120 VAC, 15.0 ampere circuit.
Two-way Radio	The power requirement for the Radio Communications system equipment is a 120 VAC, 15.0 ampere circuit.
Interior PA	The power requirement for the Interior Public Address system equipment in the security Control Post is a 120 VAC, 15.0 ampere circuit.
LCIS	The Limited Call Intercom System is usually part of the Interior PA system. If a standalone LCIS installed, the power requirement for this system is a 120 VAC, 15.0 ampere circuit.
RVIS	The power requirement for the Restricted Visits Intercom System equipment in the RV Control Post is a 120 VAC, 15.0 ampere circuit.
CATV	The power requirement for the Cable TV system equipment is a 120 VAC, 15.0 ampere circuit.
TES	The power requirement for the Terminal Equipment Space room is two 120 VAC, 15.0 ampere circuit.